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Considerations for Stuttering Assessment and Treatment of Individuals with Cerebral Palsy and Intellectual Impairment

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Abstract

Considerations for Stuttering Assessment and Treatment of Individuals with Cerebral Palsy and Intellectual Impairment

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Stuttering can be present in individuals with cerebral palsy (CP). Adding complexity to these cases, intellectual impairment is likely to co-occur with CP. Although the number of these cases is small, no literature exists that addresses best practices for this specific population. Clinical considerations are needed to guide speech-language pathologists in assessment and treatment of stuttering for individuals with CP and intellectual impairment. This paper highlights specific issues and provides recommendations for clinicians when assessing and treating stuttering in cases of this type. In the future, empirical evidence is needed regarding best practices for assessment and treatment of stuttering in individuals with CP and intellectual impairment.

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Introduction

Stuttering affects approximately 1% of the world population (Craig, Hancock, Tran, Craig, & Peters, 2002). Individuals who stutter exhibit interruptions in fluent and forward speech without any other known neurological or pathological cause. While the exact cause of this disorder remains unknown, current research has shown that stuttering is multifactorial in nature (Pertijs et al., 2014). Instead of having a single origin, various factors, such as genetics and neurophysiological factors, contribute to the cause and persistence of stuttering (American Speech-Language-Hearing Association [ASHA], n.d.a).

Concomitant disorders have been found in individuals who stutter. Articulation disorder is the most frequent co-occurring deficit in this population (Blood, Ridenour, Jr., Qualls, & Hammer, 2003). However, non-speech or language concomitant disorders are also sometimes seen in individuals who stutter. In a study by Blood, Ridenour Jr., Qualls, and Hammer (2003), 34.5% of participating children who stuttered had co-occurring non-speech-language disorders. The most frequent of these disorders was learning disability, which affected 11.4% of participants who had a co-occurring non-speech-language disorder (Blood, Ridenour Jr., Qualls, & Hammer, 2003). Although less frequent, stuttering can also co-occur with cerebral palsy (CP). In the same study by Blood, Ridenour Jr., Qualls, and Hammer (2003), 10 out of 2628 (0.4%) of participating children who stuttered had CP. Although the prevalence of stuttering in individuals with CP is seemingly low, Van Riper (1982) estimated that the incidence of stuttering in individuals

with CP is twice as high as in typically developing children. This indicates a need for clinical guidance when presented with this kind of case.

Individuals with CP are likely to have intellectual impairment. A study by Pimm (1992) found that 73% of children and adults with CP demonstrated below average intelligence. Additionally, the Centers for Disease Control and Prevention (CDC) reports that more than 40% of children with CP have intellectual disability (2006). Due to the high percentage of co-occurring intellectual impairment and CP, speech-language pathologists are likely to encounter individuals with CP who also have cognitive deficits when treating or evaluating stuttering. This comorbidity may affect the efficacy and validity of processes used to assess and treat stuttering in this population. This indicates a need for clinical guidance when evaluating and treating individuals with CP who stutter and also have intellectual impairment.

This paper will address the complexity of assessment and treatment of stuttering in individuals with CP who also have cognitive impairment. No literature exists that addresses best practices in treatment or assessment for this population. In a systematic review by Pennington, Goldbart, and Marshall (2004), only 16 studies were found that focused on speech and language therapy specific to CP, none of which addressed treatment of stuttering in this population. Further investigation also found no literature specific to stuttering in individuals with CP and intellectual impairment. The lack of research in this area leaves speech-language pathologists without evidence-based references when faced with this type of case. Because no literature exists specific to this combination of deficits, this paper will pull information from various areas of research,

such as addressing persons who stutter who have intellectual impairment and speech/language services for individuals with CP, to compile clinical considerations for assessment and treatment of stuttering for this population. This paper aims to provide speech-language pathologists with considerations specific to assessing and treating individuals who stutter and also have intellectual impairment due to the presence of cerebral palsy. Due to the lack of literature specific to this population, additional considerations for assessment and treatment of stuttering in individuals with intellectual impairment secondary to other causes will also be provided. Personal clinical examples will be interspersed throughout the paper to provide clinicians with additional context to support the recommendations provided in this paper.

Cerebral Palsy

Before providing specific recommendations for this population, it is important to provide some background information regarding CP and its characteristics.

Definition and Typical Deficits

The CDC (2017) defines CP as a group of disorders that affect an individual's ability to move, balance, and maintain posture. CP is typically caused by lack of oxygen to the brain right before, during, or immediately following birth. It exists on a continuum of severity, with some individuals minimally affected and others without the ability to walk or talk. This disorder can be subdivided into 4 main types: spastic, dyskinetic, ataxic, and mixed. The most common subtype, spastic CP, is associated with stiff muscles and awkward movements of the limbs and/or trunk. Individuals with dyskinetic CP typically have difficulty controlling movement of specific body parts, such as the hands, arms, and legs, and often have involuntary movement of specific parts of the body, including the face or the tongue. These movements can be slow and writhing or rapid and jerky and can occur intermittently at varying degrees of severity. Ataxic CP affects balance and coordination. Individuals with this type often have an unsteady gait and have difficulty maintaining control during rapid movements, such as writing. The final subdivision of CP is mixed. Individuals with this subtype present with symptoms of more than one category. The most common type of mixed CP is spastic-dyskinetic.

Due to difficulties with trunk movement and muscle coordination, individuals with CP often experience problems with respiration, such as decreased breath volume, rapid rate of breath, shallow breathing, and poor control of exhalation (Workinger, 2005).

According to a study by Solomon and Carron (1998), children with dyskinetic CP are more likely to have problems with rest breathing and breathing during speech than children with other kinds of CP. Therefore, these individuals are more likely to experience speech difficulties associated with insufficient breath support. However, any subtype of CP can present with these kinds of deficits.

Although CP is typically associated with motor dysfunction, the lack of oxygen to the brain at birth leaves individuals at risk for chronic intellectual impairment. As previously mentioned, more than 40% of children with cerebral palsy have intellectual disability (CDC, 2006). Among individuals with CP and comorbid intellectual disability, the severity of cognitive impairment can differ in severity from mild to severe (CDC, 2006).

In addition to cognitive deficits, approximately 42% of persons with CP also have communication difficulties (Pennington, Goldbart, & Marshall, 2004). Difficulties with motor planning, motor movements, cognition, and respiration can all lead to communication deficits in this population (Pennington, Goldbart, & Marshall, 2004). 36% of individuals with CP and communication deficits present with speech impairments (Pennington, Goldbart, & Marshall, 2004). According to a review of speech-language therapy caseloads by Enderby and Philipp (1986), CP was the sixth most common medical cause of communication deficits. Due to the likelihood of communication difficulties in individuals with CP, speech-language pathologists are likely to encounter this population on their caseloads.

Assessment

Stuttering Assessment for Typical Populations

In order to identify important considerations for stuttering assessment of individuals with CP and intellectual impairment, basic fluency assessment procedures with typical populations must first be reviewed. ASHA (n.d.a) recommends performing an individualized, comprehensive assessment to diagnose stuttering. Each assessment should include observation of speech disfluencies in multiple environments (e.g. clinic, school, home, etc.) in addition to evaluation of other related components, such as emotions related to speech, secondary behaviors, cognition, speech-language abilities, and relevant case history. As disfluent speech is variable and may not be present during the evaluation, the affective, behavioral, and case history components of the assessment can provide valuable insight into the individual's speech attitude, which could indicate disorder without observation of overt speech disfluencies. Both formal and informal assessment tools should be used in various environments in order to gather a specific, comprehensive picture of the individual's speech and language. After comprehensive evaluation, clinicians should determine the presence, extent, and impact of the fluency disorder as well as potential benefit from treatment (ASHA, n.d.a).

When evaluating speech disfluencies, clinicians should measure the following components: duration, clustering, and iterations of disfluencies, secondary behaviors, and frequency of disfluencies (Byrd, 2016). By evaluating all components listed above, the clinician is more likely to obtain an overall picture of the individual's fluency during connected speech in order to determine presence and/or severity of the disorder. Byrd

(2016) also cautions that diagnostic decisions should not be made on frequency of disfluencies alone, but rather all information collected should be considered together to make a determination of diagnosis.

If possible, multiple environments and types of speech samples should be gathered to evaluate speech disfluencies (Yaruss, 1997). Stuttering can be variable; often individuals who stutter exhibit more or fewer symptoms depending on the specific environment (Yaruss, 1997). Therefore, in order to capture a valid sample of an individual's speech, it is important to vary the communication environment to include various topics of conversation, physical environments, or communication partners, as these factors could potentially encourage or discourage disfluent speech depending on familiarity.

Stuttering Assessment for Individuals with Intellectual Impairment

Additional considerations should be made when evaluating stuttering in individuals with intellectual impairment. Although general guidelines still apply, the differences in cognitive status may alter the assessment procedures for this population. A meta-analysis by Bloodstein and Bernstein-Ratner (2008) estimated a prevalence of stuttering in individuals with intellectual impairment as 3%. This percentage exceeds the prevalence rate of the population at large, implying that stuttering may be more common in populations with cognitive deficits. Therefore, clinical guidance is needed for clinicians when assessing stuttering in individuals with intellectual impairment.

Standardized assessments. It is important to note that standardized assessments, while helpful in quantifying results of the individual's speech and language abilities, are

likely not accurate with populations with concomitant intellectual deficits. The authors of standardized assessments have presumably not considered this type of case when creating the assessment. Additionally, many normative assessments likely did not include individuals from this specific population in their norming population. Therefore, scores from these assessment tools may not be valid or reliable. It is also important to consider that standardized test processes may need to be amended in order to compensate for the individual's linguistic or cognitive abilities. If amended, scores from these tests may not be used to characterize an individual's communication abilities. These assessment tools may still be used with this population as an informal qualitative tool. However, speech-language pathologists should be cognizant of the limitations of standardized assessments of fluency with this specific population and should proceed accordingly, considering the unique abilities of the individual being assessed.

Differences in disfluencies. Evidence suggests that the type and pattern of disfluencies seen in individuals with intellectual disabilities may differ from those of typically developing populations (Coppens-Hofman et al., 2013; Stansfield, Collier, & King, 2011). In a study by Coppens-Hofman et al. (2013), individuals who stuttered and had intellectual disability were found to have differing frequency, types, and patterns of disfluencies when compared to their typically developing peers who stuttered. The types of stuttering-like disfluencies observed most in individuals with intellectual disability were blocks, prolongations, and word/part-word repetitions, making up 69.2%, 17%, and 14% of disfluencies respectively. These percentages differ from those seen in typically developing individuals who stutter, for which blocks and prolongations are produced at a

lower rate (Coppens-Hofman et al., 2013). Additionally, more non-stuttering like disfluencies were present in the speech of individuals who stutter with intellectual impairment. Coppens-Hofman et al. (2013) found that on average 17.5% of connected speech of individuals with intellectual impairment who stuttered was comprised of non-stuttering like disfluencies. This percentage is greater than that seen in typically developing individuals. Clinicians should be aware of these differences in disfluency types and percentages when evaluating individuals with intellectual impairment in order to better determine the presence and extent of stuttering in this population.

Speech attitude. The speech attitude of each individual should be evaluated for all cases of suspected stuttering (ASHA, n.d.a). Various measures, formal and informal, can help clinicians determine the individual's emotional attitude toward their own speech. Often, individuals with disfluent speech will express negative emotions toward their speech in the form of fear, embarrassment, anxiety, and/or avoidance behaviors (Peters & Guitar, 1991). However, it is important to determine the individual's expressive language abilities before asking for a description of communication attitude. Many individuals with intellectual impairment have limited expressive language skills, and therefore, may have difficulty expressing their emotions regarding their speech (Stansfield, Collier, & King, 2011). Because of this, clinicians must use multimodal assessment tools to gather information about speech attitude. Drawing pictures of how the client feels about their speech or pointing to pictures representing different emotions may be more appropriate for individuals with intellectual impairment to communicate their emotional relationship with speech. Additionally, if the client exhibits limited expressive language skills, it is

imperative to collect a thorough interview with the client's most frequent communication partners, such as parents, caregivers, teachers, or friends, to get the most accurate picture possible of his or her speech attitude.

In some individuals, intellectual impairment may limit or negate concern regarding his/her stutter. In these cases, assessing speech attitude may be unproductive regardless of the assessment tools used. It is important for speech-language pathologists to use clinical judgment in these cases to determine the best course of action when assessing speech attitude.

Self-awareness. In some individuals with intellectual impairment, self-awareness may be lacking (Glenn & Cunningham, 2004). This lack of awareness could potentially affect assessment of stuttering in various ways. Primarily, lack of self-awareness may result in a diminished negative attitude toward one's speech, negating a need to include affective components of stuttering in assessment and future treatment. If negative emotions toward speech are not present, the affective component of stuttering assessment may not be required. Although individuals with intellectual impairment often have limited self-awareness, research has shown that this is not always the case. Individuals who stutter and have cognitive deficit have been found to feel frustration, shame, or sadness associated with their own speech (Hammel, Haughey, Klein, & Guerin, 2008). This indicates that clinicians should not assume that individuals with intellectual impairment are detached from the affective components of stuttering. Speech attitude must be assessed for all individuals, regardless of cognitive function, as some may feel negatively toward their speech regardless of their observed level of self-awareness.

An additional consideration is the effect of self-awareness on future benefit from treatment. Typically, a person must be aware of their deficits in order to possess motivation to participate in treatment. Motivation has been found to be a significant component of successful stuttering treatment (Irani, Gabel, Daniels, & Hughes, 2012). A study by Plexico, Manning, and DiLollo (2005) found that high levels of motivation/determination directly correlated with successful treatment outcomes for seven individuals who stutter. This evidence implies that motivation to change must be present to achieve successful stuttering treatment outcomes. As motivation requires awareness of deficit, assessment of self-awareness is key to predict future treatment success. This is specifically important in individuals with intellectual impairment, as their self-awareness, which underlies motivation for change, may be lacking. If the client is unaware that they stutter and is experiencing no negative emotions about his or her speech, future benefit from treatment is likely to be limited.

Finally, the level of self-awareness of the client could influence the planning of future treatment. A low level of stuttering awareness may require inclusion of explicit stuttering education in treatment. If the client is frustrated with their ability to communicate but does not seem to understand the concept of stuttering, future treatment may focus on stuttering education at an appropriate level of complexity to address the lack of knowledge. Clinicians must assess self-awareness to gain information regarding speech attitude, motivation to change, and knowledge of stuttering in order to determine basis for treatment and to plan future therapy. Information about a client's self-awareness

should be evaluated by collecting information via interviews with the client and his/her frequent communication partners using multimodal communication when necessary.

Language abilities. Consideration must also be given to language abilities when assessing fluency in individuals with intellectual impairment. This population often has deficits in both receptive and expressive language (ASHA, n.d.b). Because of these limitations, it is recommended that clinicians evaluate skills in both areas of language as part of the stuttering assessment, as these abilities may influence assessment results as well as future benefit from treatment. If language deficits are present, clinicians should provide multimodal communication tools to ensure that the client is able to fully express him- or herself.

Additionally, communication abilities of this population may differ depending on the specific communication partner or environment. Therefore, it is important for clinicians to collect speech samples in various environments with individuals with cognitive deficits to provide more opportunities for communicative exchange. Specific environments that encourage verbal communication provide the client with more opportunity to speak, which, in turn, facilitates a more representative speech sample. By providing a variety of environments, clinicians are more likely to observe disfluent speech if stuttering is present.

Finally, clinicians must consider the effect of the client's linguistic abilities on performance during the assessment. The ability to understand and follow directions will directly impact the assessment results; limited skills in comprehension may skew assessment outcomes, resulting in invalid data. Therefore, clinicians must adapt

assessment procedures to accommodate for lower levels of language skills in order to capture assessment results that are representative of the client's abilities.

Cognitive considerations. In addition to language abilities, cognitive skills must be assessed during a stuttering evaluation. Specifically, memory and attention should be observed and evaluated. An individual's ability to recall therapeutic techniques over time and implement them within and outside of clinical settings is key to successful treatment (ASHA, n.d.a). These skills require use of memory and attention. If deficits exist in either of these areas, the speech-language pathologist must adapt the assessment session and future therapy to accommodate those difficulties.

Determining impact and benefit from treatment. Another challenge for speech-language pathologists when assessing stuttering in individuals with intellectual impairment is determining both the impact of the disorder and potential benefit from treatment. Clarifying the impact of stuttering on the client and his/her potential future benefit from treatment is a crucial part of the fluency assessment (ASHA, n.d.a). However, this task can be difficult when dealing with individuals with concomitant impairments, such as intellectual deficits. In these types of cases, the clinician is tasked with evaluating all communication abilities as a whole and determining the impairment that most negatively affects communication. Once that has been determined, the clinician is recommended to perform trial therapy tasks to see how responsive the individual is to various treatment techniques (ASHA, n.d.a). When conducting trial therapy, the clinician should keep in mind the client's ability to learn and the speed at which processing occurs. Because of the intellectual impairment, learning processes may be slowed, requiring

more repeated trials than with cognitively typical individuals (Healey, Reid, & Donaher, n.d.). Therefore, the clinician is tasked with deciphering the client's ability to learn and maintain treatment techniques in a very short amount of time during the fluency assessment, keeping in mind the individual's cognitive abilities. It may be prudent to conduct several trial therapy sessions as part of the assessment to better determine the client's potential future benefit of therapy.

Stuttering Assessment for Individuals with CP and Intellectual Impairment

In addition to the guidelines above for individuals with intellectual impairment, more specific considerations should be made when assessing speech fluency in individuals with CP who also have intellectual impairment.

Motor speech involvement. It is imperative that speech-language pathologists conduct a thorough motor speech evaluation during a stuttering assessment when CP is present. Individuals with athetoid and spastic types of CP often present with involuntary movements of oral and laryngeal structures (Workinger, 2005). Additionally, this population can have uncoordinated breathing and laryngeal function in addition to difficulty initiating phonation due to orofacial dysfunction (Workinger, 2005). These orofacial and laryngeal breakdowns can cause interruptions in fluent speech that may initially be perceived as stuttering-like disfluencies, such as word and part-word repetitions, silent blocks, or prolongations. Because of these potential interruptions, clinicians must thoroughly assess oral and laryngeal motor performance and coordination to distinguish involuntary movements from stuttering-like disfluencies.

In order to provide context to support the information above, a personal clinical example is provided. Mr. G was a client with spastic CP and intellectual impairment due to anoxia at birth for whom the author provided an assessment for stuttering and eventually treatment for three months. He was a 38-year-old male with intellectual impairment and had reported experiencing difficulty speaking for his entire life. He came to the clinic seeking evaluation for stuttering. However, he also experienced language deficits. Consequently, he was not able to effectively describe his difficulties with communication during the assessment interview. He presented with severe part-word repetitions and silent blocks during connected speech. He also reported tightness in his neck area during the stuttering moments. Because of his spastic CP diagnosis, it was important for the clinician to decipher if these disfluencies were occurring due to involuntary spasms of the larynx or due to other causes to determine future treatment procedures.

Respiration. Respiration should also be assessed in individuals with CP during stuttering evaluations. Problems with breathing have been identified as the second most common issue with the speech mechanism in individuals with CP (Solomon & Charron, 1998). Therefore, it is likely that individuals with CP who stutter will also experience problems with breathing related to speech, such as insufficient or uncoordinated breath. These difficulties could potentially affect fluency of speech and/or potential benefit from future treatment. If these deficits are present, clinicians must assess the specific presentation and their effect(s) on fluent speech. For example, a client may have limited breath support for speaking, which causes him/her to halt speech mid phrase and

sometimes mid word. These pauses could initially be perceived as disfluencies without further evaluation. Additionally, future benefit from treatment may be limited if a client presents with insufficient respiration to support speech, which is a fundamental process underlying all speech. Therefore, producing sufficient breath to support speech must be targeted in therapy before fluency of speech can be addressed.

When assessing respiratory function in individuals with CP, Solomon and Charron (1998) recommend using a four-prong approach based on research by Hixon (1993). It is important that clinicians observe four fundamental aspects of respiration: 1) pressure in the lungs, 2) the amount of air used for speech, 3) air flow or the change in lung volume over time, and 4) the configuration of the rib cage and abdominal walls during speech. By evaluating all four aspects of respiration, the clinician will gain a more in depth understanding of the client's respiratory abilities and how they may affect speech output.

Posture. Clinicians must also consider the posture of individuals with CP during speech when assessing respiratory and speech function. Due to trunk muscle weakness, older children and adults often exhibit atypical postures that could adversely affect respiratory support for speech (Workinger, 2005). The three most common abnormal postures exhibited by individuals with CP are scoliosis, kyphosis, and lordosis (Workinger, 2005). Scoliosis presents as a curve in the spine from side to side, resembling an 's' or 'c' on an x-ray. Individuals with kyphosis have curvature of the spine resulting in a hunched back. Lordosis is characterized by excessive inward curvature of the spine, resulting in a swayback appearance. Each of these atypical

postures could potentially adversely affect respiratory functioning, having a direct impact on speech production. Clinicians may want to collect speech samples from the individual in various positions in order to better determine the posture that most facilitates speech output. When assessing both respiration and posture of individuals with CP, collaboration with a physical and/or occupational therapist can provide invaluable information regarding the nature of the individual's speech difficulties (Workinger, 2005).

Rate of speech. Potential differences in rate of speech for individuals with CP and intellectual impairment must be considered during a stuttering assessment. Peters and Guitar (1991) recommend including speech rate in evaluations of fluency disorder in all cases, as it often indicates severity and impact on communication. However, the rate of speech of individuals with spastic and athetoid CP who do not stutter has been found to be slower than rates of typically developing peers. Workinger (1986) found that phrase duration was significantly slowed in individuals with spastic CP, and individuals with athetoid CP were found to have phrase durations two to three times slower than their spastic counterparts. Workinger (2005) postulates that this slowed rate may be a coping mechanism for fluctuating muscle tone and involuntary movements that are characteristic of these groups. This difference in baseline rate of speech is imperative to consider when assessing fluency in individuals with CP, as rate of speech may not be an accurate indicator of severity in these populations. Additionally, as speech rate is a common treatment strategy used to reduce disfluent speech, trial therapy during a fluency assessment should include altering this rate to help guide future treatment strategies.

Assessment Summary

A thorough and comprehensive assessment is required to determine the presence of stuttering, potential benefit from treatment, and to help plan future treatment practices. When conducting a stuttering evaluation, speech-language pathologists must consider components specific to individuals with CP and intellectual impairment and make appropriate adaptations in order to yield valid and reliable results. Assessment procedures may need to be adapted based on the specific deficits present in each individual. Speech-language pathologists must use their clinical judgment to determine the best course of action with this specific population.

Treatment

Treatment for stuttering should follow a thorough and comprehensive assessment. Although some literature exists outlining best practices for treatment of stuttering in typical populations, there are limited resources that provide guidance when treating stuttering in individuals with intellectual impairment and cerebral palsy. This section aims to provide clinicians with guidance for treating this kind of case, first focusing on treatment of stuttering in typical populations before specifying considerations for stuttering treatment in individuals with intellectual impairment and, subsequently, those with CP.

Stuttering Treatment for Typical Populations

Treatment for stuttering in typical populations should be individualized based on prior assessment. According to a study by Johnson et al. (2016), successful treatment outcomes are more likely when treatment is client-centered, individualized, and addresses emotional, situational, and practical needs of the client. Therefore, fluent speech, in addition to language factors, speech attitude, and impact of stuttering on quality of life, should be addressed in treatment for persons who stutter (ASHA, n.d.a).

Treatment of stuttering is traditionally divided into two broad approaches: stuttering modification and fluency shaping (Peters & Guitar, 1991). While these two treatment approaches are not mutually exclusive, they are characterized by differing schools of thought.

Stuttering modification approach. According to Peters and Guitar (1991) stuttering modification therapy includes two key elements: 1) teaching the modification

of stuttering moments, and 2) reducing fear of stuttering to eliminate avoidance behavior. This approach emphasizes the importance of addressing the emotional components of stuttering simultaneously with modifying the stuttering moments themselves. Stuttering modification starts with an identification phase, in which the person who stutters is asked to identify each disfluency in his or her speech as well as secondary behaviors and emotions connected to speech (Peters & Guitar, 1991). The person who stutters is responsible for identifying when he or she stutters in addition to the type and severity of the stuttering moment (what the stutter sounded like, the duration of the stutter, etc.). In the book *Stuttering: An Integrated Approach to Its Nature and Treatment*, Peters and Guitar (1991) state, "If the stutterer is to change, he must become aware of what to change" (p. 192). This step is believed to be a precursor to successful stuttering modification; without the ability to identify one's stutter, the stuttering modification strategy will likely not lead to successful outcomes.

Following the identification phase, the desensitization phase aims to reduce fear and negative emotions toward the individual's speech using confrontation of the stuttering behavior itself and to listener reactions as tools to accomplish this goal. Subsequent to desensitization, the modification phase includes steps to teach the individual to stutter in a more fluent manner via three chronological steps: cancellation, pull-out, and preparatory set. After mastering this sequence, it is assumed that the person who stutters will stutter more fluently than before treatment. The final stage in the stuttering modification approach is the stabilization phase, in which the person who stutters solidifies his or her gains from treatment. Via practice of the strategies, such as

pull-out and preparatory set, the ability to stutter more fluently is assumed to become more automatic and generalized to conversation in all environments. In addition to practice of each strategy, fluency education and open communication about emotions tied to speech are included in this approach.

Fluency shaping approach. In contrast to the stuttering modification treatment approach, fluency shaping therapy focuses on behavioral techniques to encourage fluent speech in the clinic and does not emphasize the reduction of negative speech attitude and avoidance behaviors. Instead, it is assumed that positive experiences with producing fluent speech in the clinical setting will transition indirectly to a more positive speech attitude (Peters & Guitar, 1991). This treatment approach aims to first establish some form of fluent speech in the clinical setting before trying to generalize that fluency to functional environments. As part of this treatment paradigm, fluent speech is achieved by various techniques that typically produce unnatural sounding speech. Specific strategies used to encourage fluency include slowed rate of speech, delayed auditory feedback, easy onset, yawn-sigh, breathy/soft voice, and limiting phrase length. Using these techniques, the person who stutters is assumed to achieve fluency in clinical settings, which then can be translated into functional environments with practice.

Comparison of both treatment approaches. According to Peters & Guitar (1991), these two treatment approaches differ in five clinical areas: 1) targeted speech behaviors, 2) fluency goals, 3) attention to emotions tied to speech, 4) maintenance of gains, and 5) clinical methods. The table below compares and contrasts these two treatment approaches in all five categories.

Table 1: Characteristics of stuttering modification and fluency shaping.

	Stuttering Modification	**Fluency Shaping**
Targeted speech behaviors	Moments of stuttering	Fluency skills
Fluency goals	Spontaneous fluency, controlled fluency, or acceptable stuttering	Spontaneous fluency or controlled fluency
Attention to speech attitude	Considerable attention given to feelings and attitudes	Little attention given to feelings and attitudes
Maintenance of gains	Emphasis on maintaining stuttering modification skills and changes in speech attitude	Emphasis on maintaining fluency shaping skills
Clinical methods	Loosely structured interactions	Tightly structured interaction or programmed instruction

Integration of both approaches. While these two treatment approaches differ considerably, they are not mutually exclusive. Many clinicians choose to utilize both approaches when treating individuals who stutter. Peters and Guitar (1991) recommend integrating aspects from both approaches when treating fluency disorders.

In support of the integration of these two treatment approaches, limitations have

been identified in the literature when using only fluency shaping strategies to treat stuttering. Although fluency shaping techniques often reduce disfluencies in speech, people who stutter report that use of these strategies in conversational speech frequently feels unnatural and isolating (Beilby, Byrnes, & Yaruss, 2012). Because of these potential negative effects, many clinicians put emphasis on achieving communication that is effective in lieu of fluent, incorporating emotional support along with fluency shaping strategies (Beilby, Byrnes, & Yaruss, 2012). Further supporting inclusion of affective components in stuttering treatment, Johnson et al. (2016) found evidence indicating that the use of fluency shaping techniques alone led to negative or only short-term results after treatment. Individuals who were treated using the Prolonged Speech approach, a behavioral treatment using fluency shaping techniques, had no decrease in stuttering behavior. Additionally, participants who were trained in using this technique felt fraudulent and unnatural when speaking outside of clinical settings, leading to fear and avoidance behaviors while speaking with conversation partners. Although the literature supports integration of stuttering modification and fluency shaping strategies, it is important to keep in mind that this evidence is based on persons who stutter but do not have CP and/or intellectual impairment. Therefore, this evidence should be used only as a guideline in the absence of evidence based practices for individuals who stutter who also have CP and intellectual impairment.

Limitations regarding maintenance of outcomes using fluency shaping treatment approaches alone have also been found in the research. Relapse is reported to be less

likely for individuals who have participated in treatment including cognitive and affective components when compared to individuals who received treatment lacking these components (Yaruss et al., 2002). Craig and Calvert (1991) found that although 100% of participating individuals who stuttered were satisfied with their speech immediately after fluency shaping treatment, fewer than 50% were still satisfied with their speech 10 months after treatment. Many of the participants had reported relapses in fluent speech, indicating a lack of maintenance of gains with use of fluency shaping strategies only. Additionally, these authors found that experiencing negative emotions connected to using fluency shaping techniques were linked with relapse (Craig & Calvert, 1991). This evidence supports the use of both fluency shaping techniques in conjunction with stuttering modification treatment, which addresses both fluency enhancing behavioral strategies and emotions tied to speech, in typically developing individuals who stutter.

Effective treatment. Although many specific stuttering treatments exist in the literature, there is no consensus on the most effective treatment for this disorder. In a systematic review by Baxter et al. (2016), all treatments showed some sort of gain for at least some of the participants. However, it was noted by the authors that deciphering the most effective treatment for specific populations was difficult. This emphasizes the need for individualized treatment based on the specific needs of the person who stutters.

Although no specific treatment has been identified to effectively treat stuttering for all individuals, several components of treatment have been linked to successful long-term outcomes among the majority of people who stutter. Addressing emotional

components of stuttering in treatment reportedly leads to better maintenance of gains than using fluency shaping techniques alone. In a study by Guitar and Bass (1978), speech attitudes of 20 people who stuttered were assessed pre- and post-treatment. Those who failed to reduce their negative emotions related to speech were more likely to relapse after treatment than those who had neutralized those emotions. Plexico, Manning, and Levitt (2009) also found that decreasing fear of disfluencies in conversation enhanced progress in stuttering treatment. The same study also reported that treatment that improved understanding of stuttering, via stuttering education and mindfulness practices, led to enhanced therapeutic outcomes in individuals who stutter (Plexico, Manning, & Levitt, 2009). These findings indicate that a mixed treatment approach combining both affective and behavioral components is likely to be most effective. Again, it is important to keep in mind that this evidence is based on individuals who stutter but do not have CP and/or intellectual impairment.

In addition to addressing affective components of stuttering, ability to use strategies in realistic environments also has been found to have an impact on effective treatment of stuttering. A systematic review by Johnson et al. (2016) identified a need for interventions for stuttering that are feasible in natural environments outside of clinical settings, indicating greater outcomes from treatment with incorporation of practice within naturalistic settings. Finally, inclusion of a parent, caregiver, or partner was found to impact fluency treatment. Inclusion of a partner in treatment sessions for people who stutter was reported as helpful in many cases when feasible and appropriate (Johnson et

al., 2016).

Stuttering Treatment for Individuals with Intellectual Impairment

Specific considerations should be made when providing treatment for stuttering with individuals with intellectual impairment. Although many components of stuttering treatment with typical populations still apply, individuals with intellectual impairment require specific modifications that could enhance learning capacities and improve treatment outcomes. Healey, Reid, and Donaher (n.d.) report that the presence of co-occurring disorders in children who stutter requires a different kind of treatment than those children who only stutter. Speech-language pathologists are responsible for providing treatment that is adapted for the specific individual's needs.

Planning treatment for concomitant disorders. Individuals who stutter and also have concomitant disorders present specific challenges for clinicians. Initially, priorities for intervention should be identified before treatment begins (Logan & LaSalle, 2003). Logan and LaSalle (2003) suggest evaluating the severity of impairments, the effect of impairments on daily activities, reactions of others to individual impairments, and the likeliness of impairments to resolve without intervention when creating priorities for treatment. Based on these priorities, the clinician should work with the individual and family to develop a treatment plan that addresses stuttering and other impairments as appropriate.

When faced with stuttering and other co-occurring disorders, research suggests that simultaneous treatment for both disorders provides benefit (Healey, Reid, &

Donaher, n.d.). Specific to concomitant intellectual impairment and stuttering, Preus (1990) suggests four general considerations to shape treatment: 1) intellectual capacity should be considered before chronological age, 2) speech treatment should be integrated into a holistic and educational training program, 3) treatment should be conducted in natural environments in lieu of clinical settings to encourage generalization, and 4) modeling of treatment strategies by familiar adults to the individual who stutters and has intellectual impairment should be emphasized during treatment to encourage practice and use within a naturalistic context. Using these four considerations, clinicians should plan treatment procedures that are appropriate, effective, and encourage generalization of skills.

Linguistic considerations. Many individuals with intellectual impairment have concomitant language disorder. A study by Memisevic and Hazic (2013) identified concomitant speech and language disorder in 71.3% of participating individuals with intellectual disability. These individuals may have difficulty with expressive and/or receptive language skills, which may affect how treatment is conducted. Healey, Reid, and Donaher (n.d.) suggest modifying the linguistic complexity and length of utterances when providing treatment to individuals with intellectual impairment. If a concomitant language disorder is present, a reduction in linguistic complexity will help to convey specific messages and ultimately provide more benefit from treatment. Additionally, Preus (1990) posits that modeling may be more effective than explicitly explaining strategies with this population. By adjusting language complexity and methods of

teaching, individuals with intellectual impairment who also stutter may experience more benefit in stuttering treatment.

The severity of intellectual impairment may dictate the linguistic adaptations implemented in stuttering treatment. For those individuals with more severe receptive language deficits, modeling may prove to be more effective in teaching strategies. Speech-language pathologists may need to further assess language and cognitive functioning upon initiation of treatment to ensure the most effective strategies are being used.

Awareness of stutter. Awareness of one's stutter occurs in the majority of cases with typical cognitive skills. As young as age 2, individuals who stutter have proven to show signs of awareness of disfluent speech, such as self-report of difficulty speaking or non-verbal reactions to stuttering moments (Boey et al., 2009). In a study of 1,122 children who stuttered ages two to seven years, 56.7% of 2-year-olds and 89.7% of seven-year-olds reported awareness of their stutter (Boey et al., 2009). However, individuals with intellectual impairment often experience deficits in awareness of self (Glenn & Cunningham, 2004). This lack of awareness can impair one's ability to self-monitor during treatment for stuttering. The ability to self-monitor is a foundational skill for the stuttering modification treatment approach, which requires accurate and consistent identification of stuttering moments in conversational speech. Hammel, Haughey, Klein, and Guerin (2008) treated three adults for stuttering who had intellectual impairment. They found that identifying or anticipating a stuttering moment was difficult for all participants due to cognitive impairment. This implies that treatment based on the

stuttering modification approach may not be effective if the intellectual impairment prohibits the individual from accurately identifying each stuttering moment. Historically, stuttering treatment research for individuals with intellectual impairment has focused primarily on behavior modification strategies, such as those under the fluency shaping umbrella (Healey, Reid, & Donaher, n.d.). This approach may continue to be the most beneficial for this population if awareness of stutter proves difficult.

Mindfulness practices. Mindfulness is defined as sustained, non-judgmental attention to one's ongoing mental and physical state (Grossman, Niemann, Schmidt, & Walach, 2004). By drawing an individual's attention to the present, the individual may have a resulting enhanced awareness of self, including individuals with intellectual impairment. Practices focused on mindfulness have been shown to yield successful outcomes with individuals with intellectual impairment. A systematic review by Hwang and Kearney (2013) analyzed 12 studies that used mindfulness practices to treat individuals with intellectual disabilities to reduce behavioral or psychological difficulties. All 12 studies successfully taught mindfulness practices to this population, and the majority of studies posited successful results in reduced challenging behavior or psychological difficulties. Another study evaluating the effectiveness of mindfulness practices with individuals with intellectual impairment found that when using these treatment approaches, the participants reported reduced anxiety and increased self-compassion, a common goal in treatment for stuttering as well (Idusohan-Moizer, Sawicka, Dendle, & Albany, 2015). These effects continued to be present 6-weeks post treatment. As mindfulness has been effective with individuals with intellectual

impairment, clinicians may consider implementing these practices into stuttering treatment for this population. The resulting enhanced self-awareness will likely increase benefits of treatment. As negative feelings such as fear, anxiety, and negative self-attitude are common symptoms of individuals who stutter, mindfulness practices may assist in reducing these feelings for individuals who stutter and also have intellectual disability.

In addition to reducing negative affect, mindfulness practices have also been shown to support learning in this population. A study by Kim and Kwon (2017) showed an increase in task performance in a classroom environment in children with intellectual disability when implementing mindfulness practices. This indicates that these practices may be helpful in keeping individuals with intellectual deficits on task throughout treatment sessions and may help in maintaining attention throughout each session. Because of the proven benefits of mindfulness practices with this population, speech-language pathologists may consider implementing mindfulness strategies in stuttering treatment to support self-awareness, positive emotions toward speech, and task performance.

Affective considerations. Many individuals who stutter have negative emotions surrounding speech. A study of speech attitude in preschool and kindergarten children demonstrated that children who stutter reported a significantly more negative communication attitude as rated by the KiddyCAT assessment than children who did not stutter (Vanryckeghem, Brutten, & Hernandez, 2005). This shows that stuttering can lead to negative speech attitudes and emotions surrounding speech, which should be addressed during treatment for individuals with and without intellectual impairment.

Although a negative speech attitude is associated with the majority of typical stuttering cases, historically the literature demonstrates a variety of emotional reactions to stuttering in populations with intellectual impairment. Some literature has posited that individuals with cognitive deficits do not experience negative emotional associations with speech as often as their typically developing peers. Preus (1990) noted a lack of emotional reactions to stuttering in the form of fear, anxiety, worry, or avoidance in individuals with intellectual impairment, even if the individual seemed to be aware of his or her stutter. However, other literature suggests that this is not always the case. Van Riper (1982) reported that individuals with intellectual disability who stuttered often demonstrated signs of frustration when having difficulty communicating. Additionally, in a study by Lerman, Powers, and Rigrodsky (1965), signs of tension, embarrassment, and fear were reported in this population during communicative exchanges. Due to the variability of speech attitude in this population, affective components of stuttering must be addressed in treatment of this population. If a negative speech attitude is present, clinicians must appropriately address those emotions during treatment.

When addressing negative emotions with individuals with intellectual impairment, the literature recommends adapting typical techniques in order to more concretely and explicitly address affective components of stuttering. Hassiotis et al. (2011) suggest including visual aids, pictures, role plays, and simplified language when addressing emotional components of stuttering with individuals with intellectual impairment. Additionally, Hwang and Kearney (2013) suggest avoiding abstract language with this population and instead using more concrete and descriptive scenarios,

such as metaphors, to address complex concepts. Communication boards or talking mats were also found to be useful for two individuals with intellectual impairment who stuttered in order to express and discuss emotions regarding their speech during treatment (Stansfield, Collier, & King, 2011). By using simplified language and multiple modalities of communication, individuals with intellectual impairment are more likely to understand the complex concepts of emotion tied to speech and are therefore more likely to gain more positive speech attitudes.

In order to put these modifications into perspective, a clinical example is provided below. Mr. G, as previously mentioned, a client who stutters and had intellectual impairment due to CP, was receiving treatment for his stutter. He reported having negative emotions toward his speech and often avoided speaking with others due to embarrassment and fear of disfluent speech. He also reported feelings of isolation, claiming he did not know anyone else who stuttered. When speaking about emotions, he often had difficulty expressing himself and would cut his speech short due to frustration. The clinician decided to address these emotions in treatment by educating him on the nature and prevalence of stuttering by using video examples of other individuals who stutter. Throughout treatment, the client watched videos of people who stutter and identified emotions that they had expressed related to their speech. He would then connect those emotions to his own using visual aids to express himself, demonstrating an understanding of others' and his own communication attitudes. After completing this activity several times, he increased his understanding of stuttering, measured by

answering true/false questions about stuttering, and reported a reduced sense of isolation and fear.

Generalization of skills. A challenge for all clinicians treating stuttering is generalization of skills learned during therapy to natural environments. The carryover of skills outside of clinical environments presents an even greater challenge when dealing with individuals with intellectual impairment. Healey, Reid, and Donaher (n.d.) note that generalization of skills, which occurs naturally for most children, may not occur for children with intellectual impairment. Therefore, it may be necessary to make appropriate accommodations to treatment in order to encourage carryover of skills into natural environments. In order to address this difficulty, the literature recommends adapting the treatment environment to exclusively natural and functional settings. In a study of three individuals with intellectual disability who stutter, Hammel, Haughey, Klein, and Guerin (2008) found that none of their participants successfully transferred skills learned in clinical environments to naturalistic settings. These authors recommend treating stuttering in individuals with intellectual impairment in natural environments to encourage carryover. The physical environment of treatment as well as the conversation partners must be varied to encourage use of strategies outside of the clinical setting.

Involvement of caregivers and/or familiar communication partners is also important in supporting generalization of skills in this population. In a review of stuttering in individuals with intellectual impairment, Preus (1990) noted that effectiveness of treatment may depend on implementation of strategies using familiar communication partners. If treatment strategies are learned with familiar individuals,

transfer of skills to more naturalistic environments may be more likely than if strategies are only learned with clinicians. Additionally, Stansfield, Collier, and King, (2011) reported a difficulty in recalling therapeutic strategies between treatment sessions in this population. This difficulty was mitigated with use of familiar caregivers or conversation partners supporting the use of strategies between sessions outside of the clinical setting. Healey, Reid, and Donaher (n.d.) also emphasize the importance of support outside of clinical settings. These authors argue that a support team of family, teachers, communication aids, and other familiar individuals must be recruited to actively encourage use of treatment techniques outside of clinical settings in order for individuals with intellectual deficits to learn and implement newly learned stuttering treatment strategies. Because of cognitive deficits of individuals with intellectual impairment, altering the physical and social environment of treatment may be necessary in order to achieve generalization of skills to natural environments.

Self-disclosure. Self-disclosure has been explored as a means to improve quality of life for individuals with intellectual impairment. A study by Madaus, Zhao, and Ruban (2008) examined employment satisfaction and its contributing factors for 500 university graduates with learning disability. Self-disclosure among other factors was found to have a small but significant positive correlation with employment satisfaction. This indicates that self-disclosure is a useful tool in improving quality of life for individuals with cognitive deficits.

In the area of stuttering, self-disclosure has also been used as a treatment strategy to mitigate negative listener reactions. A study by Collins and Blood (1990) examined the

effects of self-disclosure on listener perceptions of individuals who stutter. They found that a significant number of participants who did not stutter preferred communicating with individuals who acknowledged their stutter. The preference was even greater when the stutter was severe in nature. Further supporting the efficacy of self-disclosure to counteract negative listener reactions, a study by Byrd, McGill, Gkalitsiou, and Cappellini (2017) found similar results. In the study, individuals who did not stutter watched two videos of individuals who stuttered from four different categories: male self-disclosure, male no self-disclosure, female self-disclosure, and female no self-disclosure. After watching, the participants were asked to rate the speakers in the videos based on several criteria. Results indicated that people who self-disclosed were perceived by the majority (72%) as being more confident, intelligent, polite, more at ease, and not ashamed when compared to those who did not self-disclose.

Although no literature exists examining the efficacy of self-disclosure for individuals with intellectual impairment who stutter, it can be assumed that this technique may be successful in reducing negative reactions from listeners. Listeners' negative reactions to disfluent speech can lead to feelings of fear, anxiety, or avoidance. Self-disclosure may lead to alleviation of these negative reactions, resulting in a more positive communication attitude. Therefore, clinicians may choose to use self-disclosure with individuals who stutter and have intellectual impairment as it may lead to more positive listener perceptions.

Stuttering Treatment for Individuals with CP and Intellectual Impairment

In addition to the considerations specified above for individuals with intellectual impairment, additional considerations must be made specific to stuttering treatment for individuals with cerebral palsy who also present with intellectual impairment.

Respiratory considerations. As previously mentioned, breathing problems are the second most common problem of the speech mechanism in CP (Solomon & Carron, 1998). Therefore, it is likely that individuals with CP who are treated for stuttering will also have respiratory complications. The specific type of breathing difficulties seen in this population typically varies by CP subtype. Approximately half of children with ataxic CP have breathing problems characterized by irregular rate, rhythm, and depth of rest state breathing (Solomon & Carron, 1998). On the contrary, respiratory difficulties in spastic CP are presented as shallow inhalations with forced and uncoordinated expirations (Solomon & Charron, 1998). Because respiration is the foundation for all speech, these difficulties must be addressed as they may impede success of stuttering treatment.

Research suggests that addressing breathing difficulties in treatment may help to improve speech output. In a study by Blumberg (1955) individuals with CP who had both respiration and speech difficulties were provided treatment specific to their respiratory difficulties. The author found a positive correlation between improved respiration and overall speech output. However, the study also noted that the amount of improvement in breathing performance did not necessarily predict amount of gain in speech output. This evidence provides support for incorporating breathing treatment in stuttering therapy for individuals who present with respiratory difficulties.

Clinicians must use individualized strategies to treat difficulties with respiration in CP. Depending on the specific kinds of respiration problems exhibited, various techniques can be used. In a systematic review by Solomon and Charron (1998), the effectiveness of speech breathing treatment techniques was examined for individuals with CP. Their findings suggest using four therapeutic strategies to address respiratory problems stemming from muscle weakness and incoordination: breathing against resistance, diaphragmatic breathing, muscle relaxation techniques, and inspiratory checking.

Breathing against resistance is a technique used to improve breath support in individuals with CP who exhibit insufficient respiratory support for speech. In general, a minimum displacement of five centimeters of water for five seconds is sufficient breath support to sustain speech (Duffy, 2013). If breath support is lower than this limit, breathing against resistance can be used to treat this lack of subglottal support. To conduct this technique, the individual wears a facemask, blows through pursed lips, or blows bubbles in a glass of water through a straw to provide resistance while breathing for a certain amount of time on a fixed schedule. This technique has been found to improve respiratory muscle strength for speech in individuals with CP. A study by Cerny, Panzarella, and Stathopoulos (1997) used a breathing against resistance technique to improve expiratory muscle strength and subglottal pressure in 10 children with insufficient breath support. After six weeks of treatment, expiratory muscle strength increased by 69% and subglottal pressure increased by 40% on average for all

participants. This research implies efficacy of this technique to treat respiratory difficulties with weak respiratory muscles and insufficient breath support.

Diaphragmatic breathing has also been found to increase tidal volume breathing in individuals with CP exhibiting shallow breath at rest. A study by Rothman (1978) examined the effects of diaphragmatic breathing on the breath coordination and capacity of 5 children with spastic cerebral palsy. He found that on average, tidal volume breathing increased by 31% following an eight-week daily treatment. This change significantly differed from the control group. By increasing breath capacity at rest, individuals will have more breath support with which to speak, allowing more support when implementing strategies for fluent speech.

Children with spastic CP often have excessive muscle tension during speech (Workinger, 2005). This tightness of the muscles may lead to difficulty when implementing fluency strategies that emphasize relaxed speech, such as easy onset and reduced rate of speech. Muscle relaxation techniques have been shown to reduce muscle tension during phonation in individuals with CP (Solomon & Charron, 1998). A study by McDonald (1987) found that moving the individual's head from side to side and forward and backward while phonating produced less effortful phonation and encouraged generalization of muscle relaxation during speech. As muscle relaxation techniques are often unfamiliar to speech-language pathologists, collaboration with physical or occupational therapists is warranted to provide ethical and effective treatment in this area.

For problems with coordination of breath and phonation, Solomon and Charron (1998) suggest using inspiratory checking exercises with individuals with CP. This

strategy involves releasing air slowly from the lungs through gradual relaxation of expiratory muscles. Limited research demonstrates effectiveness of this strategy to improve breathing coordination. Netsell and Hixon (1992) reported success with a similar technique to address breath incoordination in individuals with traumatic brain injury. In this study, the authors described a procedure of inhaling deeply and subsequently exhaling slowly as the participant spoke. Although this study did not address CP specifically, the results can be assumed to be similar with this population. Another technique used to combat breathing incoordination is sniffing (Solomon & Charron, 1998). By pretending to sniff or blow out candles on a cake, the breath is swiftly exhaled or inhaled, supporting coordination with lack of lag time. Finally, Workinger (2005) suggests using a pushing approach to treat incoordination of breath and phonation in individuals with CP. This technique involves teaching the individual to pull up or push down on the arm of a chair or edge of a table upon initiation of phonation, thus providing tactile stimulation associated with onset of phonation. Improvement of coordination of breath and phonation may prove valuable when using fluency shaping techniques such as easy onset. This strategy requires the client to inhale and start phonation at the start of exhale, when the speech mechanism is at its most relaxed state. Problems coordinating breath and phonation would diminish benefit from this type of treatment. Therefore, addressing breath coordination deficits may be necessary in stuttering treatment of individuals with CP and intellectual impairment. In sum, clinicians treating individuals with CP for stuttering should be aware of any breathing difficulties present and should use specific treatment techniques to address these challenges.

A personal clinical example with treatment of respiration in an individual with CP is provided to give clinicians further perspective. Mr. G had excessive tone in his laryngeal area that contributed to a breathy, raspy vocal quality and inadequate breath for speaking more than 6 words per breath. The choppy quality of his speech due to insufficient breath support interrupted fluent speech in addition to his stutter. The clinician worked on posture, diaphragmatic breathing, and sustained phonation in order to increase speech breath support. At initiation of treatment, the client sustained phonation for six seconds and only produced six words per breath. After seven sessions of implementing respiratory techniques, the client increased sustained phonation to 12 seconds and produced 12 words per breath consistently in conversational exchanges with the clinician. By addressing the underlying respiratory difficulties for this client during stuttering treatment, the client improved respiratory support for speech and, in turn, improved his ability to implement fluent speech strategies.

Posture. Difficulties with body positioning can compound respiratory weakness and incoordination, fostering difficulties with speech output (Solomon & Charron, 1998). Because of posture's influence on speech output, clinicians may need to address positioning of the individual in treatment before addressing speech fluency. A study by Shin, Byeon, and Kim (2015) examined the effects of seat surface inclination on respiration used for speech in individuals with CP. They found that anterior inclination of seat position supported greater tidal volume breathing for individuals with spastic CP. Solomon and Charron (1998) recommend that positioning should address straightening the back, securing the individual to the seat, and creating a 90 degree angle of the hip,

knee, and foot in order to properly support respiration for speech in individuals with CP. In addition, the authors emphasize that the arms and head should be securely supported if necessary. Because posture is often dependent on assistive technology for this population, collaboration with a physical or occupational therapist working with the client is recommended to address these issues. If the patient is independently mobile, the clinician should still ensure that he or she is using a posture that is supportive of breath support for speech throughout treatment.

Conclusion

In certain cases, stuttering is present in individuals with CP. Adding complexity to these cases, individuals with CP are also likely to have intellectual impairment. Although the number of these cases is small, no literature exists that addresses best practices for this specific population. Clinical considerations are needed to guide speech-language pathologists in assessment and treatment of stuttering for individuals with CP and intellectual impairment. This paper provides specific considerations and recommendations for clinicians when assessing and treating stuttering in cases of this type. Just as with typically developing individuals, a thorough assessment of speech, language, and cognition is required when assessing stuttering in these individuals. However, in order to accommodate cognitive, linguistic, and structural differences, specific considerations should be made when assessing stuttering in this population. Once the presence of stuttering has been determined, additional considerations must be made in order to execute effective treatment for this population. Treatment should address behavioral as well as emotional components of speech, if present, using simplified and more concrete examples. Clinicians should also consider adapting the environment and linguistic complexity of treatment procedures to yield best results. Specific to CP, issues with respiration and posture must be addressed and may require collaboration with other professionals. Personal examples of a previous clinical case are described throughout the paper to give clinicians further context for implementing the aforementioned considerations in assessment and treatment. In the future, empirical evidence is needed regarding best practices for assessment and treatment of stuttering in individuals with CP

and intellectual impairment. The considerations specified above are offered as a basic guide to clinicians faced with this type of case until further research is done in this area.

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